

## **Remarks**

### **Status of Claims**

Without prejudice, Claims 6, 7, 10 and 12 have been cancelled to facilitate and simplify prosecution. Claim 19 has been amended to make clear that "an end face" is formed "by sublimating glass and cutting said glass fiber along said path." Additionally, the language "at least a portion" of the end face has been canceled from Claim 19 as it is potentially confusing since an end face produced by the claimed method would produce a planar end face which is either entirely at an angle greater than 15° or is not at all. These amendments are for clarification only, leaving the scope of Claim 19 essentially unchanged.

### **Allowable Subject Matter**

Applicants gratefully acknowledge the Examiners finding of allowable subject matter in Claims 9, 11, 13-15 and 18.

### **Prior Art Rejections**

With respect to the remaining claims, the Examiner rejected Claims 19-21 and 24-25 under 35 U.S.C. §103(a) as being unpatentable over Kinoshita, et al. (JP 354030590A). Specifically, with respect to Claim 19, the Examiner states as flows:

Kinoshita teaches a fiber 6 obtained by introducing a glass fiber 6 into a holding and positioning device 27; actuating a laser device 20 to deliver a beam having a power suitable for supplementing glass. See Fig. 6, item 20 and abstract; and effecting relative movement of said beam along a path across said glass fiber 6 having a predetermined angle of 90° (see page 450, second column, second paragraph), thereby supplementing glass 6 and cutting said glass fiber 6 along said path (see page 450, first column, second paragraph), wherein said fiber 6 is integrated with an optical package and positioned within said optical package in a v-groove 30

(shown in Figures 6-7, item 6 in an integrated optical package) and comprises an end face (shown at least in Figure 1, item 6) . . . .

The Examiner admitted that “Kinoshita does not specifically teach . . . (A) wherein the above movement of the beam is across the optical axis of the glass fiber, (B) the above fiber comprises end face at least a portion of which is angles at more than 15°/45° from perpendicular of said optical axis of said fiber, and (C) and end face having rounded edge.” The Examiner concluded, however, that regardless of the limitations of A and B, the arguments presented in the rejection of Claim 6 are analogous to the rejection of Claims 19 and 24. In that respect, the Examiner stated as follows:

It would have been obvious to one of ordinary skill to adjust the angle of the cutting fiber to a particular angle-such as by adjusting varying the angle of the laser with respect to the mirror 3 or the angle of the mirror 3 with respect to the laser source 1-in order to obtain an optical fiber and having a particular angle such as about more that 15°, since such range would result in obtaining an extremely high reproductive and clean end fiber having improved smoothness . . . and since it has been held that whether general conditions of a claim are disclosed in the prior art, discovering the optimal working ranges involves only routine skill in the art.

In reply, Applicants submit that Kinoshita fails to teach or suggest the claimed invention of Claim 19.

**Kinoshita Teaches Away From a Fiber Having an End Face of Greater Than 15° From Perpendicular of the Optical Axis of the Fiber**

Kinoshita fails to disclose a fiber having an end face which is angled at more that 15° from the perpendicular of the optical axis. *To the contrary*, Kinoshita *teaches away* from such structure and expressly states that its method is directed at producing fibers that have an end face which is perpendicular to the optical axis. It is well established in patent law that a reference must be considered in its entirety. Specifically, according to MPEP §2141.02, the prior art must be considered in its entirety, including disclosures that teach away from the claims.

Here, Kinoshita states that “the present invention pertains to optical fiber cutting methods and apparatuses thereof utilized for cutting optical fibers quickly with excellent *perpendicularity*.” (Translation, p. 5, ll. 18-21(emphasis added)). Additionally, in commenting on the prior art, Kinoshita states that “it is difficult to achieve perpendicularity of a cut surface with respect to the fibers axis, and much fracture occurs in the processed face.” (*Id.* at ll. 14-17). Indeed, when discussing prior art laser cutting techniques, Kinoshita states that “even when [laser cleaving] is applied to the cutting of optical fiber there are shortcomings in the perpendicularity in the end faces in that the perpendicularity of the end faces is poor ending that a heat/effective layer remains around the severed end face.” Therefore, given the clear and explicit language in Kinoshita of producing an optical fiber having excellent perpendicularity, it would be improper to modify its teachings to suggest that its method be used to prepare a fiber having an end face which is greater than 15° from perpendicular. Accordingly, Applicants respectfully submit that the rejection be withdrawn and the claims allowed.

**There is No Reasonable Likelihood of Success that the Teachings of Kinoshita can be Modified to Produce a Fiber having an End Face of Greater than 15° from Perpendicular of the Optical Axis of the Fiber**

Applicants submit that there is no reasonable likelihood of success that the teachings of Kinoshita can be modified to produce a fiber having an end face of greater than 15° from perpendicular of the optical axis of the fiber. It is well established in US patent law that a proposed modification to a reference must have a reasonable likelihood of success. As set forth in MPEP §2142:

To establish a *prima facie* case of obviousness . . . there must be a reasonable expectation of success. . . . The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. In re Vaeck, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991). See MPEP § 2143 - § 2143.03 for decisions pertinent to each of these criteria.

Here, Kinoshita discloses a method of cutting an optical fiber in which the fiber is heated with a low-power laser and then pulled axially to break it apart. Purportedly, by focusing a low-power laser (i.e., 0.1 to 5 watts) on a small, "micro" area, the laser causes a rapid thermal gradient which induces significant thermal stress in the area. Once this stress is created, the optical fiber is pulled axially, causing a crack to develop at the maximum point of thermal stress and continue perpendicularly across the fiber such that the fiber parts. Therefore, it is the application of axial force that parts the fiber to create the end face rather than the cutting action of the laser.

Applicants submit that pulling the fiber apart axially favors greatly a "break" which is perpendicular to the axis. It is not clear how one would control this break to be angled with respect to the optical axis since that would require having the "break" form at an angle to the axial force being applied which seems highly unlikely. At a minimum, there is no indication in Kinoshita that such a break is possible. Accordingly, since Kinoshita fails to suggest a likelihood of success in using its method to form a fiber having an end face which is greater than 15° from perpendicular of the optical axis of the fiber, the rejection should be withdrawn and the claims allowed.

**Kinoshita Fails to Disclose a Fiber Having a Structure Resulting From The Laser Cleaving Process**

Kinoshita fails to disclose a fiber formed by the process of laser cleaving a fiber at an angle to form an angled end face. Since this is a product-by-process claim, the Examiner must consider the end product of the process. According to MPEP §2113, product-by-process claims are limited by the structure implied by the steps. This section reads in relevant part:

The structure implied by the process steps should be considered when assessing the patentability of product-by-process claims over the prior art, especially where the product can only be defined by the process steps by which the product is made, or where the manufacturing process steps would be expected to impart distinctive structural characteristics to the final product. See, e.g., *In re Garnero*, 412 F.2d

276, 279, 162 USPQ 221, 223 (CCPA 1979) (holding "interbonded by interfusion" to limit structure of the claimed composite and noting that terms such as "welded," "intermixed," "ground in place," "press fitted," and "etched" are capable of construction as structural limitations.)

Therefore, in construing a product-by-process claim, one must consider the structure resulting from the formation process and not the process itself—i.e., the process is just a way of describing the resulting structure.

Here, claim 19 is directed to a fiber formed by effecting the relative movement of a laser beam along a path across the optical axis of the glass fiber, thereby sublimating glass and cutting the glass fiber along the path to form an end face which is angled at more than about  $15^\circ$  from perpendicular of the optical axis. The resulting structure of this process is a fiber having an end face in which the glass on the end face had been subject to the effects of surface tension due to the glass being in a molten state during cutting. This surface tension produces a "skin" on the surface which is exceedingly smooth. Additionally, the surface tension also tends to "round" any edges of the surface. This feature is explicitly recited in claim 20 in which the edge around the end face is characterized as "rounded."

A fiber produced according to the method of Kinoshita would not have an end face having such features. Specifically, as mentioned above, the Kinoshita process for cutting a fiber is distinctly different from that of the claimed invention in that it uses a low-power laser to *avoid* melting the fiber. Therefore, since the fiber material is not ablated or even melted in Kinoshita, the surface properties of the end face made with the process will be distinctly different from those produced using laser cleaving. For instance, with respect to claim 20 in particular, unlike the present invention in which the surface tension of the molten glass tends to produce a rounded edge, in Kinoshita there is no molten or soften fiber and therefore the effects of surface tension are not present. Without such forces, a rounded edge would not be produced. Therefore, since the fiber

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prepared by the laser cleaving process of the claimed invention is different from that of Kinoshita, the rejection should be withdrawn and the claims allowed.

In light of the above remarks, an early and favorable response is earnestly requested.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'SJD', is written over a horizontal line.

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